

**University of Bahrain**  
**College of Information Technology**  
*Department of Computer Engineering*

**ITCE 202: Digital Logic**  
**Test 1**

**Time: 1:00 hour**

**Date: November 2<sup>nd</sup>, 2004**

Question	Marks	Score
1	24	
2	18	
3	18	
4	20	
5	20	
Total	100	

ID. No.	Name:	Sec.:
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Show all your work.

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**Q1 ( 24 points)**

**(4 points) (a) Convert  $(326.5)_8$  to Hexadecimal**

**(4 points) (b) The following number 1 1 1 0 0 0 0 1 1 0 0 1 0 1 1 1 represents decimal digits in 4-3-2-1 weighted code. Find its equivalent in BCD weighted code.**



**(8 Points) (c)** Divide in binary 1 1 1 0 1 00 by 1 0 1 0 and approximate the result up to two fraction bits.

**(8 Points) (d)** Perform the binary addition of the two decimal numbers (+39) and (-28), assume that the numbers are represented in 2's complement form.

**Q2- ( 18 points)**

**(10 Points) (a)** Simplify the following function to a minimum Sum of product form

$$Z = A \bar{B} C + F + (A \bar{B} D + C \bar{D})(\bar{C} E + \bar{F} + A \bar{B} D)$$



**(8 Points) (b)** Given that:  $Z = \overline{E}G (A \oplus B + \overline{CE})(\overline{A} + BG)$

Use De'Morgan's Theorem to find  $\overline{Z}$ . Express your answer in a sum of product form (Do not simplify).

**Q3 (18 points)**

For the circuit shown in figure 1, find:



**(10 Points) (a)**  $Z$  in a standard Sum of product (minterm form)

**(8 Points) (b)**  $\overline{Z}$  in a standard product of sums (algebraic form).



**Q4 ( 20 points)**

Realised the function Z given by the following equation using the minimum number of 2-inputs NAND gates only.

$$Z = \overline{A} B C \overline{D} + E \overline{F} + B \overline{D} \overline{G} + B \overline{D} \overline{E}$$

**Q5- ( 20 points)**

Given the Boolean function:  $F = \overline{A} C D + A B \overline{C} \overline{D} + A B C + A C D + \overline{A} B \overline{C} \overline{D}$

Assuming that the inputs ABCD = 0000, ABCD = 1000, and ABCD = 1101 never occur, find a minimum NOR-NOR network implementation for F.

